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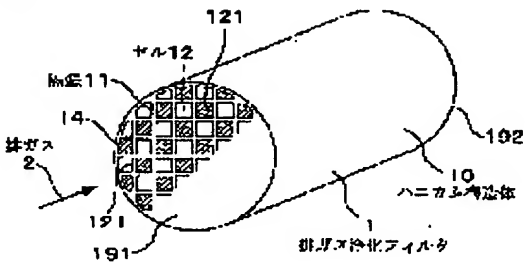
(54) EXHAUST GAS PURIFYING FILTER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an exhaust gas purifying filter exhibiting enhanced purification efficiency and reduced pressure drop.
SOLUTION: In this exhaust gas purifying filter 1, particulates in the exhaust gas 2 delivered from an internal combustion engine are collected in order to purify the exhaust gas 2. The exhaust gas purifying filter 1 is provided with a partition wall 11 having a large amount of pores, and a honeycomb structure body 10 having a cell 12 partitioned by the partition wall 11. A surface aperture area ratio of the pore having a surface aperture diameter of 10 μm or less in the partition wall 11 is 20% or less with respect to a total surface aperture area ratio.

(図1)



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CLAIMS

[Claim(s)]
[Claim 1] The rate of surface opening area have the honeycomb structure object which has the septum by which this emission-gas-purification filter has much pores in the emission-gas-purification filter which carries out uptake of the particulate in the exhaust gas discharged by the internal combustion engine, and purifies exhaust gas, and the cel divided by this septum, and according [the diameter of surface opening] to pore 10 micrometers or less in the above-mentioned septum is the emission-gas-purification filter with which it is characterized by to be 20% or less of the whole rate of surface opening area.
[Claim 2] The rate of surface opening area according [on claim 1 and / the diameter of surface opening] to pore 70 micrometers or more in the above-mentioned septum is the emission-gas-purification filter with which it is characterized by being 40% or less of the whole rate of surface opening area.
[Claim 3] In the emission-gas-purification filter which carries out uptake of the particulate in the exhaust gas discharged by the internal combustion engine, and purifies exhaust gas this emission-gas-purification filter It has the honeycomb structure object which has the septum which has much pores, and the cel divided by this septum. The above-mentioned septum The emission-gas-purification filter characterized by for the porosity according [pore size] to less than 10-micrometer pore being 10% or less, and the porosity by the pore to which pore size exceeds 70 micrometers being 10% or less.
[Claim 4] It is the emission-gas-purification filter characterized by the porosity by the pore to which, as for the above-mentioned septum, pore size exceeds 70 micrometers in claim 3 being 5% or less.
[Claim 5] It is the emission-gas-purification filter characterized by the above-mentioned honeycomb structure object consisting of either cordierite, silicon carbide, aluminum titanate or a phosphoric-acid zirconium in any 1 term of claims 1-4.
[Claim 6] It is the emission-gas-purification filter characterized by the porosity of the above-mentioned whole septum being 55 - 75% in any 1 term of claims 1-5.
[Claim 7] It is the emission-gas-purification filter which the above-mentioned emission-gas-purification filter comes to prepare a plug part in one opening of the above-mentioned cels, and opening of the cel which prepared the above-mentioned plug part in the end face of the above-mentioned honeycomb structure object, and opening of the cel which has not prepared the above-mentioned plug part are arranged by turns in any 1 term of claims 1-6, and is characterized by the area of opening of the above-mentioned cel being 2 0.6-2.25mm.
[Claim 8] It is the emission-gas-purification filter characterized by the above-mentioned septum having a diameter of average surface opening larger than average pore size in any 1 term of claims 1-7.
[Claim 9] The above-mentioned septum is an emission-gas-purification filter with which it is characterized by the diameter of average surface opening being 1.5 or more times of average pore size in claim 8.
[Claim 10] The above-mentioned septum is an emission-gas-purification filter with which it is characterized by the diameter of average surface opening being 1.5 to 2 twice the average pore size in claim 9.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the emission-gas-purification filter which carries out uptake of the particulate in the exhaust gas discharged by the internal combustion engine, and purifies exhaust gas.
[0002]
[Description of the Prior Art] There is an emission-gas-purification filter which carries out uptake of the particulate in the exhaust gas discharged by the internal combustion engine conventionally, and purifies exhaust gas. This emission-gas-purification filter has the honeycomb structure object which has the septum which has much pores, and the cel divided by this septum.
[0003] In case exhaust gas is purified using this emission-gas-purification filter, exhaust gas is introduced into the above-mentioned cel, the above-mentioned septum is passed, and it is made to move to the next cel. At this time, uptake of the particulate in the above-mentioned exhaust gas is carried out to the above-mentioned septum, and the above-mentioned exhaust gas is purified. Moreover, for example, decomposition removal of the particulate which carried out uptake can be carried out by catalytic reaction by making the above-mentioned septum support a catalyst.
[0004] As engine performance of the above-mentioned emission-gas-purification filter, it is important that the purification effectiveness of exhaust gas is high and that the pressure loss of the exhaust gas to pass is small. Then, the emission-gas-purification filter which specified porosity, an aperture, etc. in the predetermined range and raised the engine performance is proposed as indicated by the patent No. 2726616 official report.
[0005]
[Problem(s) to be Solved] However, in the recent years when a much more highly efficient emission-gas-purification filter is demanded, it is difficult to fully reduce improvement in the purification effectiveness of exhaust gas, and pressure loss of exhaust gas also with the above-mentioned conventional emission-gas-purification filter.
[0006] That is, as shown in drawing 6 , the diameter of surface opening and pore size of each pore 93 in the septum 91 of the above-mentioned emission-gas-purification filter are uneven. Therefore, a particulate accumulates on the front face 911 of the above-mentioned septum 91, and the phenomenon in which plug up the opening 931 of pore 93 or it is discharged, without carrying out uptake of the particulate to the above-mentioned septum 91 arises. Consequently, it is difficult to aim at improvement in sufficient purification effectiveness, and reduction of pressure loss.
[0007] This invention was made in view of this conventional trouble, its purification effectiveness is high, and pressure loss tends to offer a small emission-gas-purification filter.
[0008]
[Means for Solving the Problem] In the emission-gas-purification filter which the 1st invention carries out uptake of the particulate in the exhaust gas discharged by the internal combustion engine, and purifies exhaust gas this emission-gas-purification filter It has the honeycomb structure object which has the septum which has much pores, and the cel divided by this septum. The above-mentioned septum The diameter of surface opening is in the emission-gas-purification filter with which the rate of surface opening area by pore 10 micrometers or less is characterized by being 20% or less of the whole rate of surface opening area (claim 1).
[0009] The rate of surface opening area according [the diameter of surface opening] to pore 10 micrometers or less in the above-mentioned septum is 20% or less of the whole rate of surface opening area. That is, there is "little too small pore of the diameter of surface opening" with which it tends

[comparatively] to get a particulate blocked in opening. Therefore, it can prevent getting a particulate blocked in opening of pore and accumulating on the above-mentioned septum. Thereby, exhaust gas can fully be introduced into the above-mentioned pore. So, purification effectiveness of exhaust gas can be made high enough. Moreover, pressure loss of the exhaust gas introduced into the above-mentioned emission-gas-purification filter can be made small.
[0010] Like the above, according to the 1st invention, purification effectiveness is high and pressure loss can offer a small emission-gas-purification filter.
[0011] In the emission-gas-purification filter which the 2nd invention carries out uptake of the particulate in the exhaust gas discharged by the internal combustion engine, and purifies exhaust gas this emission-gas-purification filter It has the honeycomb structure object which has the septum which has much pores, and the cel divided by this septum. The above-mentioned septum It is in the emission-gas-purification filter characterized by for the porosity according [pore size] to less than 10-micrometer pore being 10% or less, and the porosity by the pore to which pore size exceeds 70 micrometers being 10% or less (claim 3).
[0012] The porosity according [pore size] to less than 10-micrometer pore in the above-mentioned septum is 10% or less. That is, there is "little too small pore of pore size" constituting the cause of increase of the pressure loss of the exhaust gas introduced into the above-mentioned emission-gas-purification filter. Therefore, pressure loss of exhaust gas can be made small. Moreover, it can protect that a particulate accumulates on a septum that there is "little too small pore of pore size" with which it tends [comparatively] to get a particulate blocked in pore. Therefore, exhaust gas can fully be introduced into pore and purification effectiveness can be made high.
[0013] Moreover, the porosity by the pore to which pore size exceeds 70 micrometers is 10% or less. That is, there is "little too large pore of pore size" which cannot carry out uptake of the particulate comparatively easily. Therefore, the above-mentioned septum can fully carry out uptake of the particulate. So, the above-mentioned emission-gas-purification filter can make purification effectiveness high enough.
[0014] Like the above, according to the 2nd invention, purification effectiveness is high and pressure loss can offer a small emission-gas-purification filter.
[0015]
[Embodiment of the Invention] in the 1st above-mentioned invention (claim 1), there is a diesel power plant etc. as the above-mentioned internal combustion engine (the following -- the same). Moreover, "the diameter of surface opening" means the diameter of opening of the pore in the front face of a septum. The diameter of surface opening is measured for example, using a laser depth microscope. That is, the image processing of the 200 times as many expansion image as the front face of the above-mentioned septum is carried out under the above-mentioned laser depth microscope. A part with larger depth than a predetermined value can be detected as opening of the pore in the front face of the above-mentioned septum by this, and the diameter of surface opening can be computed.
[0016] moreover, with "the rate of surface opening area according [the diameter of surface opening] to pore 10 micrometers or less", the area of all the pores of the 10 micrometers or less of the above-mentioned diameters of surface opening to the area of the septum measured under the laser depth microscope comes out comparatively, and it is (the following -- the same). Moreover, as for the above-mentioned emission-gas-purification filter, it is desirable to come to support a catalyst to the above-mentioned septum including the wall of pore. Thereby, decomposition removal of the particulate by which uptake was carried out to the above-mentioned septum can be carried out according to an operation of the above-mentioned catalyst.
[0017] Moreover, it is desirable that the rate of surface opening area according [the diameter of surface opening] to pore 70 micrometers or more in the above-mentioned septum is 40% or less of the whole rate of surface opening area (claim 2). In this case, purification effectiveness can be raised further.
[0018] Next, in the 2nd above-mentioned invention (claim 3), the above-mentioned pore size can be measured by the porosimeter of for example, a mercury press fit type, and can be obtained. Moreover, the above-mentioned porosity is the value which measured by the porosimeter of for example, a mercury press fit type, and was acquired, and is the volume of the pore per unit volume of a septum. Moreover, the porosity by the pore to which, as for the above-mentioned septum, pore size exceeds 50 micrometers is 10% or less preferably.
[0019] Moreover, it is desirable that the porosity by the pore to which, as for the above-mentioned septum, pore size exceeds 70 micrometers is 5% or less (claim 4). In this case, the above-mentioned septum can much more fully carry out uptake of the particulate. So, the above-mentioned emission-gas-purification filter can make purification effectiveness still higher. Moreover, the porosity by the pore to which pore size exceeds 50 micrometers is 5% or less preferably.

[0020] Next, it is desirable that the above-mentioned honeycomb structure object consists of either cordierite, silicon carbide, aluminum titanate or a phosphoric-acid zirconium (claim 5). In this case, the septum which has the desired diameter of surface opening, pore size, and porosity can be formed easily.
[0021] Moreover, it is desirable that the porosity of the above-mentioned whole septum is 55 - 75% (claim 6). Thereby, purification effectiveness is higher still and pressure loss can offer a small emission-gas-purification filter. When the above-mentioned porosity is less than 55%, there is a possibility that pressure loss may become high. On the other hand, when the above-mentioned porosity exceeds 75%, there is a possibility that the reinforcement of an emission-gas-purification filter may fall.
[0022] Moreover, it is desirable that the above-mentioned emission-gas-purification filter comes to prepare a plug part in one opening of the above-mentioned cels, and opening of the cel which prepared the above-mentioned plug part in the end face of the above-mentioned honeycomb structure object, and opening of the cel which has not prepared the above-mentioned plug part are arranged by turns, and the area of opening of the above-mentioned cel is 2 0.6-2.25mm (claim 7).
[0023] Also in this case, purification effectiveness is high and pressure loss can offer a small emission-gas-purification filter. In using the above-mentioned emission-gas-purification filter, in one end face of the above-mentioned honeycomb structure object, it introduces exhaust gas into the above-mentioned cel from opening which has not prepared the above-mentioned plug part. The introduced exhaust gas passes the above-mentioned septum, moves to the next cel, and is discharged from opening which has not prepared the plug part of this cel. And in case the above-mentioned exhaust gas passes a septum, purification of exhaust gas is performed.
[0024] Since opening of the cel which prepared the above-mentioned plug part in the end face of the above-mentioned honeycomb structure object, and opening of the cel which has not prepared the above-mentioned plug part are arranged by turns like the above, the cel which introduces exhaust gas, and the cel of each other to discharge will be arranged as ****. So, exhaust gas passes the above-mentioned septum efficiently. Therefore, the emission-gas-purification filter excellent in purification effectiveness can be obtained.
[0025] Moreover, since the area of opening of the above-mentioned cel is 2 0.6-2.25mm, purification effectiveness is still higher and pressure loss can offer a small emission-gas-purification filter. When the area of opening of the above-mentioned cel is less than [0.6mm] two, there is a possibility that pressure loss may become large. On the other hand, when the above-mentioned area exceeds 2 2.25mm, there is a possibility that purification effectiveness cannot fully be acquired.
[0026] Moreover, it is desirable that the above-mentioned septum has a diameter of average surface opening larger than average pore size (claim 8). In this case, purification effectiveness is still higher and pressure loss can offer a small emission-gas-purification filter. With the above-mentioned diameter of average surface opening, the diameter of surface opening of all the pores formed in the above-mentioned septum is averaged. Moreover, with the above-mentioned average pore size, the pore size of all the pores formed in the above-mentioned septum is averaged.
[0027] That is, as for saying [that the diameter of average surface opening is larger than average pore size], pore with the larger diameter of surface opening than pore size will exist more than a fixed rate. And in the opening, a particulate cannot deposit the pore with the larger diameter of surface opening than pore size comparatively easily, and it tends to carry out uptake of the particulate inside. So, purification effectiveness can be raised while preventing blockading the above-mentioned pore. Therefore, when such pore exists at a rate sufficient like the above, purification effectiveness can be made high enough and pressure loss can be made small enough. As mentioned above, the diameter of surface opening is measured for example, using a laser depth microscope, and pore size is measured using the porosimeter of for example, a mercury press fit type.
[0028] Moreover, as for the above-mentioned septum, it is desirable that the diameter of average surface opening is 1.5 or more times of average pore size (claim 9). In this case, purification effectiveness is still higher and pressure loss can offer a small emission-gas-purification filter.
[0029] Moreover, as for the above-mentioned septum, it is more desirable that the diameter of average surface opening is 1.5 to 2 twice the average pore size (claim 10). By specifying the diameter of average surface opening to 2 double less or equal of average pore size, it is because decline in purification effectiveness can be prevented.
[0030]
[Example] (Example 1) It explains about the emission-gas-purification filter concerning the example of this invention using drawing 1 - drawing 4 . The emission-gas-purification filter 1 of this example carries out uptake of the particulate in the exhaust gas discharged from the diesel power plant as an internal combustion

engine, and purifies exhaust gas.
[0031] This emission-gas-purification filter 1 has the honeycomb structure object 10 which has the septum 11 which has much pores 13, and the cel 12 divided by this septum 11, as shown in drawing 1 - drawing 3 . The rate of surface opening area according [the diameter A of surface opening which shows the above-mentioned septum 11 to drawing 3] to the pore 13 10 micrometers or less is 20% or less of the whole rate of surface opening area. Moreover, the rate of surface opening area according [the diameter A of surface opening] to the pore 13 70 micrometers or more in the above-mentioned septum 11 is 40% or less of the whole rate of surface opening area.
[0032] The diameter of the opening 131 of the pore [in / in the above "the diameter of surface opening" / the front face 111 of a septum 11] 13 is said. The diameter A of surface opening is measured using a laser depth microscope. That is, the image processing of the 200 times as many expansion image as the front face 111 of the above-mentioned septum 11 is carried out under the above-mentioned laser depth microscope. This detects a part with larger depth than a predetermined value as opening 131 of the pore 13 in the front face 111 of the above-mentioned septum 11, and the diameter A of surface opening is computed. Moreover, the above-mentioned rate of surface opening area is the value which measured under the laser depth microscope and was acquired, and is the surface opening area of the pore 13 which exists in per unit area of a septum 11.
[0033] moreover, "the rate of surface opening area according [the diameter of surface opening] to the pore 13 10 micrometers or less" is the area of the accumulation which pore 10 micrometers or less occupies [the above-mentioned diameter of surface opening] to the unit area of a septum 11 (the following -- the same). Moreover, the above-mentioned emission-gas-purification filter 1 comes to support a catalyst to the above-mentioned septum 11 including the wall of pore 13 (illustration abbreviation). Thereby, decomposition removal of the particulate by which uptake was carried out to the above-mentioned septum 11 can be carried out according to an operation of the above-mentioned catalyst. Moreover, the above-mentioned honeycomb structure object 10 consists of cordierite. In addition, it can replace with this cordierite and silicon carbide, aluminum titanate, or a phosphoric-acid zirconium can also be adopted. Moreover, the porosity of the above-mentioned whole septum 11 is 55 - 75%.
[0034] As shown in drawing 1 and drawing 2 , the above-mentioned emission-gas-purification filter 1 forms a plug part 14 in one opening 121,122 of the above-mentioned cels 12, and becomes it. In the end face 191,192 of the above-mentioned honeycomb structure object 10, the opening 121,122 of the cel 12 which formed the above-mentioned plug part 14, and the opening 121,122 of the cel 12 which has not formed the above-mentioned plug part 14 are arranged by turns. That is, as shown in drawing 1 , when the above-mentioned honeycomb structure object 10 is seen from an end face 191,192, the above-mentioned plug part 14 is arranged so that it may become the shape of so-called checker. Moreover, the area of the opening 121,122 of the above-mentioned cel 12 is 2 0.6-2.25mm.
[0035] Moreover, the above-mentioned septum 11 has a diameter of average surface opening larger than average pore size. That is, many pores 13 of the structure where the opening 131 as shown in drawing 4 is large and where the interior is narrow are formed. Specifically, the diameter of average surface opening is 1.5 to 2 twice the average pore size. With the above-mentioned diameter of average surface opening, the diameter of surface opening of all the pores 13 formed in the above-mentioned septum 11 is averaged. Moreover, with the above-mentioned average pore size, the pore size of all the pores 13 formed in the above-mentioned septum 11 is averaged.
[0036] In using the above-mentioned emission-gas-purification filter 1, as shown in drawing 2 , in one end face 191 of the above-mentioned honeycomb structure object 10, it introduces exhaust gas 2 into the above-mentioned cel 12 from the opening 121 which has not formed the above-mentioned plug part 14. The introduced exhaust gas 2 passes the above-mentioned septum 11, moves to the next cel 12, and is discharged from the opening 122 which has not formed the plug part 14 of this cel 12. And in case the above-mentioned exhaust gas 2 passes a septum 11, purification of exhaust gas 2 is performed.
[0037] In manufacturing the above-mentioned emission-gas-purification filter 1, the cordierite raw material which consists of the SiO2 following raw material, MgO-SiO2 raw material, and 2Oaluminum3 raw material is adjusted. That is, SiO2 raw material and MgO-SiO2 raw material make a particle 40 micrometers or more 20 or less % of the weight of the whole, and make a particle 10 micrometers or less 20 or less % of the weight of the whole. Moreover, 2Oaluminum3 raw material makes a particle 70 micrometers or more 10 or less % of the weight of the whole, and makes a particle 5 micrometers or less 10 or less % of the weight of the whole.
[0038] Extrusion molding of the water is added, kneaded and carried out to the above-mentioned cordierite

raw material, and a honeycomb Plastic solid is acquired. Desiccation and baking are performed after shaping, and after that, to opening of the predetermined cel in the above-mentioned honeycomb Plastic solid, it calcinates, after applying the slurry used as a plug part 14 to the shape of so-called checker. This manufactures the honeycomb structure object 10 which formed the plug part 14. This ceramic structure 10 is made to support the catalyst of platinum etc., and the emission-gas-purification filter 1 is obtained (drawing 1).

[0039] Next, it explains per operation effectiveness of this example. The rate of surface opening area according [the diameter of surface opening] to the pore 13 10 micrometers or less in the above-mentioned septum 11 is 20% or less of the whole rate of surface opening area. That is, there is "little too small pore of the diameter of surface opening" with which it tends [comparatively] to get a particulate blocked in opening 131. Therefore, it can prevent getting a particulate blocked in the opening 131 of pore 13, and accumulating on the above-mentioned septum 11.

[0040] Thereby, exhaust gas 2 can fully be introduced into the above-mentioned pore 13. So, purification effectiveness of exhaust gas 2 can be made high enough. Moreover, pressure loss of the exhaust gas 2 introduced into the above-mentioned emission-gas-purification filter 1 can be made small.

[0041] Moreover, since the rate of surface opening area according [the diameter of surface opening] to the pore 13 70 micrometers or more is 40% or less of the whole rate of surface opening area, the above-mentioned septum 11 can raise purification effectiveness further.

[0042] Next, the above-mentioned honeycomb structure object 10 consists of either cordierite, silicon carbide, aluminum titanate or a phosphoric-acid zirconium. Therefore, the septum which has the desired diameter of surface opening, pore size, and porosity can be formed easily. Moreover, since the porosity of the above-mentioned whole septum 11 is 55 - 75%, it can offer the emission-gas-purification filter 1 with still smaller pressure loss.

[0043] Moreover, in the end face 191,192 of the above-mentioned honeycomb structure object 10, the opening 121,122 of the cel 12 which formed the above-mentioned plug part 14, and the opening 121,122 of the cel 12 which has not formed the above-mentioned plug part 14 are arranged by turns. Therefore, the cel 12 which introduces exhaust gas 2, and the cel 12 of each other to discharge will be arranged as ****. So, exhaust gas 2 passes the above-mentioned septum 11 efficiently. Therefore, the emission-gas-purification filter 1 excellent in purification effectiveness can be obtained.

[0044] Moreover, since the area of the opening 121,122 of the above-mentioned cel 12 is 2 0.6-2.25mm, purification effectiveness is still higher and pressure loss can offer the small emission-gas-purification filter 1.

[0045] Moreover, the above-mentioned septum 11 has a diameter of average surface opening larger than average pore size (drawing 4). So, purification effectiveness can be further made high and pressure loss can be made small. That is, as for saying [that the diameter of average surface opening is larger than average pore size], the pore 13 with the larger diameter of surface opening than pore size will exist more than a fixed rate. And in the opening 131, a particulate cannot deposit the pore 13 with the larger diameter of surface opening than pore size comparatively easily, and it tends to carry out uptake of the particulate inside. So, purification effectiveness can be raised while preventing blockading the above-mentioned pore 13. Therefore, when such pore 13 exists at a rate sufficient like the above, purification effectiveness can be made high enough and pressure loss can be made small enough.

[0046] Like the above, according to this example, purification effectiveness is high and pressure loss can offer a small emission-gas-purification filter.

[0047] (Example 2) This example is an example of the emission-gas-purification filter 1 which specified the pore size of a septum 11. That is, the porosity according [pore size] to the less than 10-micrometer pore 13 in the above-mentioned septum 11 is 10% or less. And the porosity by the pore 13 to which pore size exceeds 70 micrometers is 10% or less. In addition, the porosity by the pore to which pore size exceeds 70 micrometers is 5% or less more preferably.

[0048] The above-mentioned pore size can be measured by the porosimeter of a mercury press fit type, and can be obtained. Moreover, the above-mentioned porosity is the value which measured by the porosimeter of a mercury press fit type, and was acquired, and is the volume of the pore per unit volume of a septum 11. Moreover, in this example, especially the diameter of average surface opening of the pore 13 of a septum 11 is not specified. Others are the same as that of an example 1.

[0049] The porosity according [pore size] to the less than 10-micrometer pore 13 in the above-mentioned septum 11 is 10% or less. That is, there is "little too small pore of pore size" constituting the cause of increase of the pressure loss of the exhaust gas 2 introduced into the above-mentioned emission-gas-

purification filter 1. Therefore, pressure loss of exhaust gas 2 can be made small. Moreover, that there is "little too small pore of pore size" with which it tends [comparatively] to get a particulate blocked in pore 13 can protect that a particulate accumulates on a septum 11. Therefore, exhaust gas 2 can fully be introduced into pore 13, and purification effectiveness can be made high.

[0050] Moreover, the porosity by the pore 13 to which pore size exceeds 70 micrometers is 10% or less. That is, there is "little too large pore of pore size" which cannot carry out uptake of the particulate comparatively easily. Therefore, the above-mentioned septum 11 can fully carry out uptake of the particulate. So, the above-mentioned emission-gas-purification filter 1 can make purification effectiveness high enough.

[0051] Like the above, according to this example, purification effectiveness is high and pressure loss can offer a small emission-gas-purification filter.

[0052] (Example 3) This example is an example which measured the relation between the diameter of average surface opening in the septum of an emission-gas-purification filter, and the pressure loss of exhaust gas, as shown in drawing 5 . Specifically, the diameter of average surface opening measured the pressure loss in the pore which is nine kinds of range which is 3 micrometers - 65 micrometers by changing the particle diameter of SiO2 raw material, Mg-SiO2 raw material, and 2Oaluminum3 raw material. A measurement result is shown in drawing 5 .

[0053] If the diameter of average surface opening is set to 10 micrometers or less so that drawing 5 may show, pressure loss will become large especially. This example shows that that the pore of 10 micrometers or less of diameters of surface opening exists mostly becomes the big cause of reducing pressure loss. So, when the diameter of surface opening lessens pore 10 micrometers or less shows that pressure loss can be reduced.

[0054] (Example 4) This example is an example which measured the relation between distribution of the pore size in the septum of an emission-gas-purification filter, and the pressure loss of exhaust gas and particulate collection efficiency, as shown in Table 1. That is, as shown in Table 1, the emission-gas-purification filter with which the rate of the porosity by the pore of less than 10 micrometers of pore size to the whole porosity differs from the rate of the porosity by larger pore than 70 micrometers of pore size to the whole porosity and whose number is four was prepared. These were made into the sample 1 - the sample 4, respectively, as shown in Table 1.

[0055] Measurement of the above-mentioned pore size measured the porosity by the pore of the corresponding pore size by pressing mercury fit in the interior of pore first using the porosimeter of a mercury press fit type to the 10x10x15mm sample started from the emission-gas-purification filter. Moreover, the exhaust gas containing a particulate was made to flow by the flow rate for 2m2/to each above-mentioned emission-gas-purification filter. And the manometer was used and the pressure loss before and behind an emission-gas-purification filter was measured. The result is shown in Table 1. In Table 1, the ratio of pressure loss expresses the ratio to this by making the value of the pressure loss of a sample 1 into criteria (100).

[0056] Moreover, while measuring the mass M1 and M2 of an emission-gas-purification filter before and after making exhaust gas flow, respectively, the particulate mass N which passed the emission-gas-purification filter was measured. And it is formula P=(M2-M1)/(M2-M1+N) based on the above-mentioned mass M1, M2, and N.

The particulate collection efficiency P was computed by being alike and calculating more. A calculation result is shown in Table 1.

[0057]

[Table 1]

(表1)

	全体の気孔率に対する該当する細孔の気孔率の割合		圧力損失比	捕集率P
	細孔径10μm未満	細孔径70μmより大		
試料1	12.0%	17.0%	100	60%
試料2	21.4%	7.5%	160	80%
試料3	22.2%	2.6%	180	99%
試料4	6.0%	4.0%	80	96%

[0058] Pressure loss becomes high, so that the porosity by the pore of less than 10 micrometers of pore size is large, as shown in Table 1, and pressure loss becomes low, so that the porosity by the pore of less than 10 micrometers of pore size is small. On the other hand, collection efficiency P becomes low, so that the

porosity by the pore exceeding 70 micrometers of pore size is large, and collection efficiency becomes high, so that the porosity by the pore exceeding 70 micrometers of pore size is small.
[0059] And the percentage of the porosity by the pore of less than 10 micrometers of pore size is 10% or less, and the sample 4 whose percentage of the porosity by the pore exceeding 70 micrometers of pore size is also 10% or less has [the ratio of pressure loss is low and] (80) and high collection efficiency (96%). This result shows that pressure loss can be made low and collection efficiency can be made high by making the rate of the porosity by the pore of less than 10 micrometers of pore size into 10% or less, and making the rate of the porosity by the pore exceeding 70 micrometers of pore size into 10% or less.

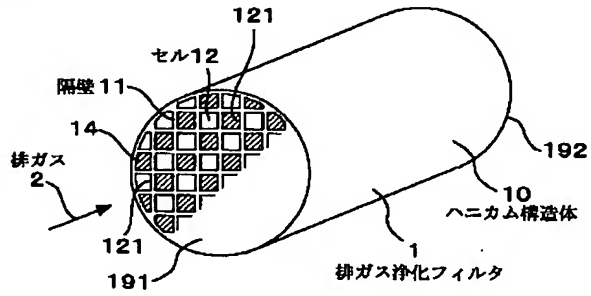
[Translation done.]

* NOTICES *

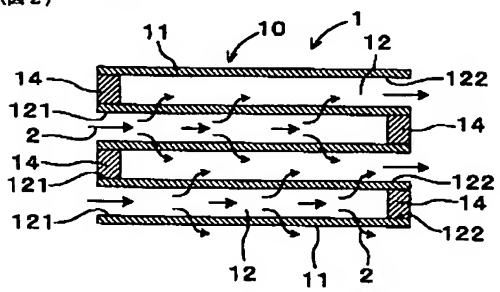
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

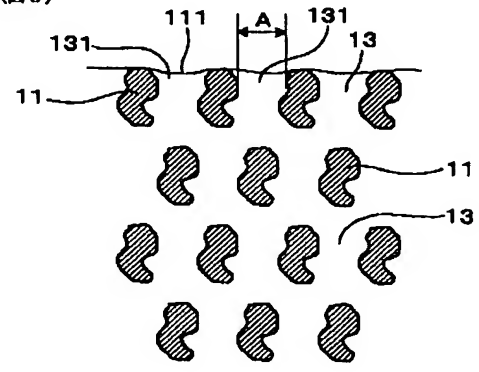
[Drawing 1]
(図1)



[Drawing 2]
(図2)

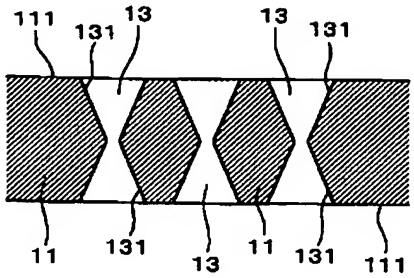


[Drawing 3]
(図3)



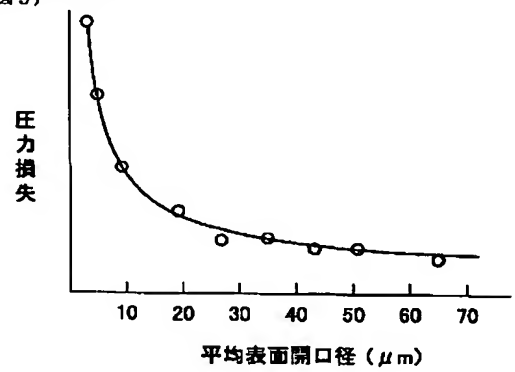
[Drawing 4]

(図4)



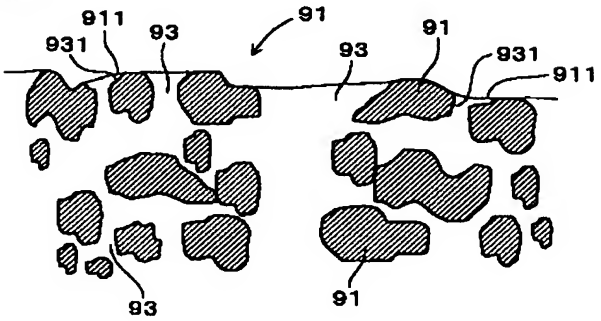
[Drawing 5]

(図5)



[Drawing 6]

(図6)



[Translation done.]